AMENDMENT AND RESPONSE UNDER 37 CFR § 1.111
Serial Number: 10/668,428
Filing Date: September 23, 2003
Title: NEURAL NETWORK BASED LEARNING ENGINE TO ADAPT THERAPIES

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IN THE CLAIMS

Please amend the claims as follows:

1. (Original)   A system providing adaptive medical therapies utilizing a neural network based learning engine to a cardiac patient, the system comprising:

a cardiac device module for providing adaptive medical therapies to the patient, the cardiac device module comprises:

a cardiac device data collection module for collecting patient data associated with the cardiac health state of the patient's heart;

a cardiac therapy module for applying corrective medical therapies to the patient's heart upon detection of undesired health conditions; and

a runtime neural network module for processing collected patient data to determine the corrective medical therapies to be applied using the cardiac therapy module;

an artificial neural network processing module for training and validating the operation of a neural network, the artificial neural network processing module comprising:

a cardiac neural network training module for processing collected patient data to determine a set of operating coefficients used by the artificial neural network when determining optimal treatment therapies;

a cardiac device interface module for receiving collected patient data from the cardiac device module and for transmitting the set of operating coefficients used by the artificial neural network when determining optimal treatment therapies; and

collected patient data history data store for maintaining all of the patient collected data history and treatment therapies; and

a communications link between the cardiac device module and the artificial neural network processing module;

wherein the cardiac device runtime neural network module and the neural network training module implement identical networks of nodes.

2. (Original)   The system according to claim 1 wherein the cardiac device module further comprises:

a collected patient data storage module for maintaining a copy of relevant collected patient data collected by the cardiac device data collection module; and

an artificial neural network processing module interface module for transmitting collected patient data from the cardiac device module and for transmitting the set of operating coefficients used by the artificial neural network when determining optimal treatment therapies.

3. (Original)   The system according to claim 2, wherein the artificial neural network processing module interface module further receives the set of operating coefficients used by the artificial neural network when determining optimal treatment therapies from the artificial neural network processing module.

4. (Original)   The system according to claim 3, wherein the collected patient data comprises one or more data values associated with the current state of the patient's heart.

5. (Currently Amended)   The system according to claim 4, wherein the one or more data values associated with the current state of the patient's heart comprise data values associated with an A Rate, a V Rate, an A Rate dispersion, a V Stability, an AV pattern, an NSR template, an arrhythmia template, sensed morphology, a number of past attempts required to treat a given observed condition, an identity of a particular therapy that provided an effective treatment of an observed condition, or and an identity identify of a particular therapy that provided an ineffective treatment of an observed condition.

6. (Original)   The system according to claim 1, wherein the artificial neural network processing module further comprises:

a user interface module for providing a medical technician with an ability to interact with the artificial neural network processing module and to input data associated with optimal treatment therapies into the artificial neural network processing module.

7. (Original)   The system according to claim 6, wherein the artificial neural network processing module utilizes the cardiac device interface module for transmitting the set of operating coefficients used by the artificial neural network when determining optimal treatment therapies to the cardiac device module.

8. (Original)   The system according to claim 1, wherein the communications link between the cardiac device module and the artificial neural network processing module is used to transmit collected patient data and the set of operating coefficients used by the artificial neural network when determining optimal treatment therapies between the cardiac device module and the artificial neural network processing module.

9. (Original)   The system according to claim 8, wherein the communications link utilizes an RF communications channel.

10. (Original) The system according to claim 8, wherein the communications link utilizes an optical communications channel.

11. (New)   A system, comprising:
         an implantable cardiac device including:
                  means for applying corrective medical therapies to a patient;
                  means for collecting health-related data from the patient; and
                  a first portion of an artificial neural network, the first portion adapted to provide
         real time network operation and to adapt applied medical therapies based on collected
         data; and
         an external data processing apparatus including:
                  a second portion of the artificial neural network, the second portion adapted to
         train and validate the operation of the neural network to match optimal treatment options
         based on the collected data,
                  wherein the cardiac device and data processing apparatus are adapted to communicate to
         pass the collected patient data from the device to the apparatus, and are further adapted to

communicate to pass a set of operating coefficients from the apparatus to the device, the coefficients used by the artificial neural network when determining optimal treatment therapies.

12. (New)   The system of claim 11, wherein the external data processing apparatus further includes:

    means for storing collected patient data, the storing means adapted to maintain all
    of the patient collected data history and treatment therapies.

13. (New)   The system of claim 11, wherein the collected patient data comprises one or more data values associated with the current state of the patient's health.

14. (New)   The system of claim 13, wherein the one or more data values associated with the current state of the patient's health comprise data values associated with an identity of medications known to be taken by the patient.

15. (New)   The system of claim 13, wherein the one or more data values associated with the current state of the patient's health comprise data values associated with an age of the patient.

16. (New)   The system of claim 13, wherein the one or more data values associated with the current state of the patient's health comprise data values associated with vital statistics at a last observed exertion of the patient.

17. (New)   A method, comprising:

    forming a cardiac device module for providing adaptive medical therapies to a cardiac
patient, including:

        forming a cardiac device data collection module for collecting patient data
    associated with the cardiac health state of the patient's heart;

        forming a cardiac therapy module for applying corrective medical therapies to the
    patient's heart upon detection of undesired health conditions; and

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forming a runtime neural network module for processing collected patient data to determine the corrective medical therapies to be applied using the cardiac therapy module;

forming an artificial neural network processing module for training and validating the operation of a neural network, including:

forming a cardiac neural network training module for processing collected patient data to determine a set of operating coefficients used by the artificial neural network when determining optimal treatment therapies;

forming a cardiac device interface module for receiving collected patient data from the cardiac device module and for transmitting the set of operating coefficients used by the artificial neural network when determining optimal treatment therapies; and

forming a collected patient data history data store for maintaining all of the patient collected data history and treatment therapies; and

forming a communications link between the cardiac device module and the artificial neural network processing module;

wherein the cardiac device runtime neural network module and the neural network training module are formed to implement identical networks of nodes.

18. (New)   The method of claim 13, wherein forming an artificial neural network processing module includes forming the processing module as part of a data processing system external to the patient.

19. (New)   The method of claim 13, wherein forming a cardiac device module includes forming an implantable medical device.

20. (New)   The method of claim 13, wherein forming a collected patient data history data store includes forming a database.